METHODS AND DEVICES FOR EVALUATING BEAM BLUR IN A CHARGED-PARTICLE-BEAM MICROLITHOGRAPHY APPARATUS

Abstract of the Disclosure

Methods and devices are disclosed for evaluating the imaging performance of a charged-particle-beam (CPB) microlithography apparatus. A measurement mark is situated at an object plane, a knife-edged reference mark is situated at an image plane, and a beam-limiting diaphragm, defining a beam-limiting aperture, is situated downstream of the reference mark. The knife-edged reference mark is defined as a respective aperture in a scattering membrane. Passage of a charged particle beam through the measurement mark produces a beamlet that is scanned over the knife-edged reference mark. Charged particles of the beamlet passing through the reference mark are not scattered, while charged particles of the beamlet passing through the membrane are forward scattered. The diameter of the beam-limiting aperture can be established such that an axial angle of the beam-limiting aperture as measured at the knife-edge is slightly greater than a convergent angle of the beamlet at a projection lens. Consequently, the non-scattered charged particles pass through the beam-limiting aperture to a detector while most of the forward-scattered charged particles are blocked by the beam-limiting diaphragm.